

WHAT IS CLAIMED IS

Subpt 1

A semiconductor device comprising:

a base substrate;

a first conducting film formed on the base substrate and including two conductor patterns adjacent to each other;

an etching stopper film covering an upper surface of the first conducting film;

a first insulation film which is an insulation film formed on the etching stopper film and the base substrate and includes a contact hole which reaches the base substrate between the two conductor patterns and end of which is positioned on the etching stopper film on the conductor patterns; and

a sidewall insulation film formed on side walls of the two conductor patterns of the first conducting film and of the etching stopper film on the two conductor patterns in the contact hole.

2. A semiconductor device comprising:

a base substrate;

a first conducting film formed on the base substrate and including a plurality of conductor patterns adjacent to each other;

an etching stopper film covering an upper surface of the first conducting film;

a first insulation film which is an insulation film

buried between said a plurality of conductor patterns and includes a contact hole which reaches the base substrate between the conductor patterns and having an end thereof defined by the conductor patterns; and

a sidewall insulation film formed on side walls of the first conducting film and of the etching stopper film in the contact hole.

3. A semiconductor device according to claim 2, wherein

a plurality of the contact holes are formed adjacent to each other with the conductor patterns therebetween.

4. A semiconductor device according to claim 1, further comprising:

a second insulation film having a lower dielectric constant than the etching stopper film between the first conducting film and the etching stopper film.

5. A semiconductor device according to claim 2, further comprising:

a second insulation film having a lower dielectric constant than the etching stopper film between the first conducting film and the etching stopper film.

6. A semiconductor device according to claim 5, wherein

the etching stopper film is formed of conducting film.

7. A semiconductor device according to claim 6, further comprising:

a second conducting film formed on the first insulation film and connected to the base substrate in the contact hole, and wherein

the etching stopper film is formed only in a region where the first conducting film intersects the second conducting film.

8. A semiconductor device according to claim 2, wherein

the sidewall insulation film is formed of a material having etching characteristics substantially equal to those of the etching stopper film, and formed on an entire region of the side walls of the first conducting film and the etching stopper film.

Subj 2
9. A semiconductor device comprising:
a semiconductor substrate;
a plurality of word lines formed on the semiconductor substrate and extended in a first direction;
an etching stopper film covering upper surfaces of the word lines;
a first insulation film which is an insulation film formed on the etching stopper film and the semiconductor substrate and includes a contact hole which reaches the semiconductor substrate between the word lines and having an end of which is positioned on the etching stopper film on the word lines; and
a sidewall insulation film formed on side walls of the

word lines and the etching stopper film in the contact hole.

10. A ~~semiconductor~~ device according to claim 9,
further comprising:

a plug buried in the contact hole.

11. A semiconductor device comprising:

a semiconductor substrate;

a plurality of word lines formed on the semiconductor substrate and extended in a first direction;

a first insulation film formed on the word lines and the semiconductor substrate;

a plurality of bit lines formed on the first insulation film and extended in a second direction which intersects the first direction;

an etching stopper film covering upper surfaces of the bit lines;

a second insulation film which is an insulation film formed on the etching stopper film and the first insulation film, and includes a contact hole formed between the bit lines and having an end thereof positioned on the etching stopper film on the bit lines;

a sidewall insulation film formed on side walls of the bit lines and the etching stopper film in the contact hole; and

a capacitor having one electrode connected to the semiconductor substrate through the contact hole.

12. A semiconductor device comprising:

a semiconductor substrate;

a plurality of word lines formed on the semiconductor substrate and extended in a first direction;

a first insulation film formed on the word lines and the semiconductor substrate;

a plurality of bit lines formed on the first insulation film and extended in a second direction which intersects the first direction;

an etching stopper film covering upper surfaces of the bit lines;

a second insulation film which is an insulation film buried between said a plurality of bit lines, and includes a contact hole formed between the bit lines and having an end thereof defined by the bit lines;

a sidewall insulation film formed on side walls of the bit lines and the etching stopper film in the contact hole; and

a capacitor having one electrode connected to the semiconductor substrate through the contact hole.

13. A semiconductor device according to claim 11, wherein

 said one electrode of the capacitor is connected to the semiconductor substrate through a plug buried in the first insulation film.

14. A semiconductor device according to claim 12,

wherein

said one electrode of the capacitor is connected to the semiconductor substrate through a plug buried in the first insulation film.

15. A method for fabricating a semiconductor device comprising:

a first conducting film forming step of forming on a base substrate a first conducting film including a plurality of conductor patterns adjacent to each other, and having an upper surface thereof covered with an etching stopper film;

a first insulation film forming step of forming a first insulation film buried between said a plurality of conductor patterns;

a contact hole forming step of etching the first insulation film with the etching stopper film as a mask to form a contact hole which reaches the base substrate between the conductor patterns and an end of which is defined by the conductor patterns; and

a sidewall insulation film forming step of forming a sidewall insulation film on side walls of the first conducting film and the etching stopper film in the contact hole.

16. A method for fabricating a semiconductor device according to claim 15, wherein

in the contact hole forming step the first insulation

film is etched with a photoresist having an opening extended over said a plurality of conductor patterns and the etching stopper film as a mask to form a plurality of the contact holes in the opening.

17. A method for fabricating a semiconductor device according to claim 15, further comprising before the first conducting film forming step,

a device isolation film forming step of forming a device isolation film buried in the base substrate.

18. A method for fabricating a semiconductor device according to claim 16, further comprising before the first conducting film forming step,

a device isolation film forming step of forming a device isolation film buried in the base substrate.

19. A method for fabricating a semiconductor device comprising:

a word line forming step of forming on a semiconductor substrate a plurality of word lines extended in a first direction and having upper surfaces thereof covered with an etching stopper film;

a first insulation film forming step of forming a first insulation film on the etching stopper film and the semiconductor substrate;

a contact hole forming step of forming in the first insulation film a contact hole which reaches the semiconductor substrate between the word lines, and an end

of which is positioned on the etching stopper film on the word lines;

a sidewall insulation film forming step of forming a sidewall insulation film on side walls of the word lines and of the etching stopper film in the contact hole; and

a bit line forming step of forming on the first insulation film a plurality of bit lines extended in a second direction which intersects the first direction and connected to the semiconductor substrate through the contact hole.

20. A method for fabricating a semiconductor device comprising:

a word line forming step of forming on a semiconductor substrate a plurality of word lines extended in a first direction and having upper surfaces thereof covered with an etching stopper film;

a first insulation film forming step of forming a first insulation film buried between the word lines;

a contact hole forming step of etching the first insulation film with the etching stopper film as a mask to form a contact hole which reaches the semiconductor substrate between the word lines and an end of which is defined by the word lines;

a sidewall insulation film forming step of forming a sidewall insulation film on side walls of the word lines and the etching stopper film in the contact hole; and

a bit line forming step of forming on the first insulation film a plurality of bit lines extended in a second direction which intersects the first direction and connected to the semiconductor substrate through the contact hole.

21. A method for fabricating a semiconductor device comprising:

a word line forming step of forming on a semiconductor substrate a plurality of word lines extended in a first direction and having upper surfaces thereof covered with an etching stopper film;

a sidewall insulation film forming step of forming a sidewall insulation film having etching characteristics substantially equal to those of the etching stopper film on side walls of the word lines and of the etching stopper film;

a first insulation film forming step of forming a first insulation film buried between the word lines with the sidewall insulation film formed on;

a contact hole forming step of etching the first insulation film with the etching stopper film and the sidewall insulation film as a mask to form a contact hole which reaches the semiconductor substrate between the word lines and an end of which is defined by the sidewall insulation film; and

a bit line forming step of forming on the first

insulation film a plurality of bit lines extended in a second direction which intersects the first direction and connected to the semiconductor substrate through the contact hole.

22. A semiconductor device according to claim 20, wherein

in the contact hole forming step, the first insulation film is etched with a photoresist including an opening extended over the word lines, and the etching stopper film as a mask to form a plurality of the contact holes in the opening.

23. A semiconductor device according to claim 21, wherein

in the contact hole forming step, the first insulation film is etched with a photoresist including an opening extended over the word lines, and the etching stopper film as a mask to form a plurality of the contact holes in the opening.

24. A semiconductor device according to claim 19, further comprising before the bit line forming step,

a plug forming step of forming a plug buried in the contact hole.

25. A semiconductor device according to claim 20, further comprising before the bit line forming step,

a plug forming step of forming a plug buried in the contact hole.

26. A semiconductor device according to claim 21, further comprising before the bit line forming step,

a plug forming step of forming a plug buried in the contact hole.

27. A method for fabricating a semiconductor device comprising:

a word line forming step of forming on a semiconductor substrate a plurality of word lines extended in a first direction;

a first insulation film forming step of forming a first insulation film on the semiconductor substrate with the word lines formed on;

a bit line forming step of forming on the first insulation film a plurality of bit lines extended in a second direction which intersects the first direction and having upper surfaces thereof covered with an etching stopper film;

a second insulation film forming step of forming a second insulation film on the etching stopper film and the first insulation film;

a contact hole forming step of forming in the second insulation film a contact hole which is formed between the bit lines and an end of which is positioned on the etching stopper film on the bit lines;

a sidewall insulation film forming step of forming a sidewall insulation film on side walls of the bit lines and

of the etching stopper film in the contact hole; and
a capacitor forming step of forming on the second
insulation film a capacitor having one electrode connected
to the semiconductor substrate through the contact hole.

28. A method for fabricating a semiconductor device
comprising:

a word line forming step of forming on a semiconductor
substrate a plurality of word lines extended in a first
direction;

a first insulation film forming step of forming a
first insulation film on the semiconductor substrate with
the word lines formed on;

a bit line forming step of forming on the first
insulation film a plurality of bit lines extended in a
second direction which intersects the first direction and
having an upper surface thereof covered with an etching
stopper film;

a second insulation film forming step of forming a
second insulation film buried between the bit lines;

a contact hole forming step of etching the second
insulation film with the etching stopper film as a mask to
form a contact hole which is formed on between the bit
lines and an end of which is defined by the bit lines;

a sidewall insulation film forming step of forming a
sidewall insulation film on side walls of the bit lines and
of the etching stopper film in the contact hole; and

a capacitor forming step of forming on the second insulation film a capacitor having one electrode connected to the semiconductor substrate through the contact hole.

29. A method for fabricating a semiconductor device according to claim 27, wherein

in the contact hole forming step, the second insulation film is etched with a photoresist having a pattern which alternately covers a region between the word lines, and the etching stopper film as a mask to form a plurality of the contact holes.

30. A method for fabricating a semiconductor device according to claim 28, wherein

in the contact hole forming step, the second insulation film is etched with a photoresist having a pattern which alternately covers a region between the word lines, and the etching stopper film as a mask to form a plurality of the contact holes.

31. A method for fabricating a semiconductor device according to claim 27, wherein

in the contact hole forming step, the first insulation film and the second insulation film are etched to form a contact hole which reaches the semiconductor substrate and an end of which is defined by the bit lines and the word lines.

32. A method for fabricating a semiconductor device according to claim 28, wherein

in the contact hole forming step, the first insulation film and the second insulation film are etched to form a contact hole which reaches the semiconductor substrate and an end of which is defined by the bit lines and the word lines.

33. A method for fabricating a semiconductor device according to claim 27, wherein

in the bit line forming step, the etching stopper film is formed of a conductor; and

in the capacitor forming step the etching stopper film is processed in the same pattern as said one electrode of the capacitor.

34. A method for fabricating a semiconductor device according to claim 28, wherein

in the bit line forming step, the etching stopper film is formed of a conductor; and

in the capacitor forming step the etching stopper film is processed in the same pattern as said one electrode of the capacitor.

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